

ABSTRACT

A recirculating hydrogen-oxygen alkaline fuel-cell (AFC) includes an alkaline matrix electrolyte interposed between a porous anode and porous cathode, and an oxygen flow network in fluid connection with the porous cathode. The oxygen flow network has an input portion for supplying oxygen and an output portion for removing oxygen and reaction products after electrochemical reaction. A hydrogen flow network is in fluid connection with the porous anode. The hydrogen network has an input portion for supplying hydrogen and an output portion for removing hydrogen and reaction products after electrochemical reaction. At least one of the oxygen flow network and the hydrogen flow network includes a feedback conduit to form a recirculation loop. The recirculation loop feeds back a portion of the hydrogen or oxygen flow after electrochemical reaction to the input portion.